REMARKS

Claims 1, 3-7, 9-12, 15-25 and 27 are pending in the present application. Claims 1, 3-7, 9-12, 15-25 and 27 have been rejected by the Examiner. By this Response, claims 1 and 11 have been amended as discussed with the Examiner. The Applicant respectfully submits that the pending claims define allowable subject matter.

Claims 1, 3-7, 9-12, 15-25 and 27 were rejected under 35 U.S.C. § 103(a) as being anticipated by Ergun et al. (USP 6,298,109) in view of Friemel (USP 6,162,174).

Friemel relates to dividing a plurality of images into segments of image data in order to track objects in motion between the plurality of images (col. 3, lines 47-66, Figures 3 and 4). Friemel uses segments to compare certain segments between successive images. Friemel constructs a movement vector to describe movement of an object from one segment into another segment (col. 3, lines 64-67 and col. 4, lines 1-43). Thus, the multiple segments describe and are intended to be used as usuable, valid image data, not reference. No distinction between clinical and non-clinical data is made, and no masking is performed or contemplated. On the contrary, Friemel determines movement of an object with respect to adjacent images (col. 5, lines 8-27). Then, an interpolated image is created from adjacent images scaled by the movement vectors (col. 5, lines 8-38).

The portion of Friemel cited by the Examiner, column 3, lines 45-63, as well as Friemel in its entirety, does not mention or suggest dividing an image into at least two bands including at least one non-clinical region. Segments in Friemel are all clinical regions used to illustrate movement, as discussed through Friemel. No distinction between clinical and non-clinical regions is contemplated in Friemel, and no masking is ever mentioned. No dynamic range calculation is performed in Friemel based on a clinical region within the bands.

Thus, Friemel is distinct and different from the claimed invention. Friemel does not disclose determining whether a digital medical image within at least two bands includes at least one non-clinical region (col. 3, lines 45-63). Friemel tracks object movement but does not address or

contemplate a distinction between clinical and non-clinical regions. No masking is performed in Friemel. Additionally, Friemel does not identify clinical and non-clinical regions within a digital medical image. The processor of Friemel also does not contemplate masking non-clinical regions or determining the dynamic range of a clinical region. These limitations are recited in claims of the present application.

As previously discussed, Ergun relates to a system for voltage and current adjustment for an x-ray tube based on two exposures at different voltages (Abstract; col. 2, lines 60-65). A generalized image transformation polynomial is used to remove image distortion and rotate the image (Abstract; col. 3, lines 38-52). A scatter map may also be calculated to reduce scatter in the image (Abstract).

Ergun relates to a C-arm x-ray system in which the x-ray tube is connected to an x-ray tub power supply which separately controls the current and voltage to the x-ray tube based on signals received from a computer (col. 7, lines 12-25). A charge couple device (CCD) camera provides digital radiation values to the computer for processing (col. 7, lines 31-67). The computer compares the current image pixels to the last pixels obtained from the image (col. 8, lines 10-15). A difference between the pixel values reflects a difference in the amount of x-ray flux received at the CCD camera (col. 8, lines 15-20). The difference is mapped to a weight between zero and one (col. 8, lines 15-21). The weighted pixels may be used to reduce noise in the image (col. 8, lines 22-58).

Ergun also remaps data from the CCD camera to the image to correct for pincushion-type distortion (col. 9, lines 15-18). Parameters may be used to reduce distortion and rotate the image with polynomials and pixel shift information (col. 9, lines 40-67; col. 10, lines 1-13). Radiation data may then be mapped to pixel brightness using a second transformation (col. 10, lines 48-60). Ergun further controls the fluence of the x-ray beam as a function of tissue density to control exposure and noise (col. 10, lines 63-67; col. 11, lines 1-10).

Additionally, the system of Ergun attempts to eliminate "background pixels" by binning pixels from the CCD camera according to their values to create a multiple peaked plot (col. 11,

lines 13-32). Pixels associated with a certain value are removed from the exposure rate calculation (col. 11, lines 54-61). Then, the exposure rate is calculated based on the values of the remaining pixels, and an amperage and voltage value are transmitted to the x-ray tube power supply (col. 11, lines 62-66). Background pixel elimination is based on the type of material being imaged (col. 15, lines 6-10).

Scatter reduction may also be pursued in Ergun used two images obtained at different x-ray energies (col. 15, lines 33-45). A scatter map may be formed using an occluder with a plurality of x-ray blocking lead pins (col. 15, lines 66-67; col. 16, lines 1-40). The scatter map is normalized and subtracted from the image to reduce scatter in the image (col. 16, lines 57-67; col. 17, lines 1-2).

Ergun does not discuss dividing or segmenting an image. As stated by the Examiner, Ergun does not teach or suggest determining whether a digital medical image with the at least two bands includes at least one non-clinical region. Rather than dividing an image into bands, Ergun looks at background or scatter pixels scattered randomly throughout the image. Further, Ergun does not mask non-clinical regions identified in one or more bands of an image. Ergun simply does not divide or band an image but rather focuses on eliminating individual pixels in the image (see, for example, columns 11 and 12). The attenuation and non-attenuation regions of the image are defined as general regions and are mentioned in relation to a scatter map, rather than masking non-clinical regions and calculating dynamic range of a digital medical image, as recited in claims of the present application.

Ergun, as shown in Figure 11, for example, does not differentiate between clinical and non-clinical regions in bands of an image. Ergun does not mask non-clinical regions. And Ergun does not compare grayscale values to mask non-clinical regions in at least one band of an image.

Furthermore, independent claim 1 has been amended by this response. Amended claim 1 recites the limitations of generating a profile for each of the two or more bands of predetermined width and determining whether the digital medical image within the two or more bands includes at

least one non-clinical region based on the profile. Neither Ergun nor Friemel teach or suggest generating a profile or determining a non-clinical region based on the profile. Therefore, the Applicant respectfully submits that independent claim 1 and its dependent claims should be allowable.

Additionally, independent claim 11 has been amended by this response. Amended claim 11 recites the limitation that the dynamic range module computes dynamic range characteristics based on the dynamic range, wherein the dynamic range characteristics are capable of adjusting the digital medical image. Neither Erugn nor Friemel teach or suggest computing dynamic range characteristics based on the dynamic range, wherein the dynamic range characteristics are capable of adjusting the digital medical image. Therefore, the Applicant respectfully submits that independent claim 11 and its dependent claims should be allowable.

Thus, as illustrated above, the limitations of the claimed invention simply are not present in Ergun and are not even suggested by Ergun. Even bringing in Friemel and arguing that one of ordinary skill in the art would combine Ergun with Friemel does not cure the defects left by Ergun when compared to the claimed invention. For example, as discussed above, Ergun does not teach or suggest determining whether a digital medical image within at least two bands include at least one non-clinical region. Furthermore, Friemel does not teach or suggest such a determination of one or more non-clinical regions but rather tracks an object among a plurality of segments in adjacent images to determine a movement vector. Thus, this and other limitations of the claimed invention are not taught nor are they suggested by the cited art. Therefore, the Applicant respectfully submits that the claims of the present application are allowable. The Applicant respectfully requests an action to that effect.

CONCLUSION

The Applicant respectfully submits that the pending claims define allowable subject matter. Should anything remain in order to place the present application in condition for allowance, the Examiner is kindly invited to contact the undersigned at the telephone number listed below.

Please charge any additional fees or credit overpayment to the Deposit Account of McAndrews, Held & Malloy, Ltd., Account No. 070845.

Respectfully submitted,

Date: May 17, 2004

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